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(54) Title: HYBRID PHOSPHOINOSITIDE PHOSPHOLIPIDS: COMPOSITIONS AND USES

(57) Abstract: The methods and compositions disclosed herein concern the synthesis of a novel class of "two-headed" phospholipid-phosphoinositide hybrids possessing a carbon backbone, such as 2,3-diacylthreitol, erythritol or a synthetic module. The second phospholipid head group allows introduction of a biochemical or chemical moiety in a position orthogonal in space to those occupied by the phosphoinositide head group and the two acyl chains. The diacyl moieties allow for the incorporation of Pca-PIP<sub>2</sub> into a lipid bilayer, while the PtdIns(4,5)P<sub>2</sub> moiety in the aqueous layer is specifically recognized by lipid binding proteins. In alternative embodiments of the invention, reporters, for example biotin, fluorophores and/or spin labels, are attached to the free amino group of the head groups of such molecules to specifically target the reporters to the lipid-water interface.

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